MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 1, 2018/2019

PMT0201 – MATHEMATICS II

(All sections/ Groups)

25th OCTOBER 2018
9.00 a.m. – 11 a.m.
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This question paper consists of **TWO** printed pages excluding cover page.
2. Answer **ALL FOUR** questions. All questions carry equal marks and the distribution of the marks for each question is given.
3. Please write all your answers in the **QUESTION BOOKLET**. All necessary working steps **MUST** be shown.

Question 1 (10 Marks)

a) Given that $\tan\theta = -\frac{5}{12}$ and the angle θ is in quadrant II. Without using calculator, find the exact value of $4\sin\theta + 3\cos\theta$. (5 marks)

b) Given that $f(x) = 2\cos\left(2\left(x - \frac{\pi}{3}\right)\right) + 1$

(i) Determine the amplitude, period, phase shift and vertical shift of $f(x)$. (2 marks)

(ii) Sketch one complete period of the function $f(x)$. (3 marks)

Question 2 (15 Marks)

a) (i) Prove the following identity: $\text{cosec}\,2\theta + \cot 2\theta = \cot\theta$. (3 marks)

(ii) Using the identity in (i), find $\tan 22.5°$. (2 marks)

b) A tunnel is built through a hill. Find the length of the tunnel using the data provided in Figure 2b.

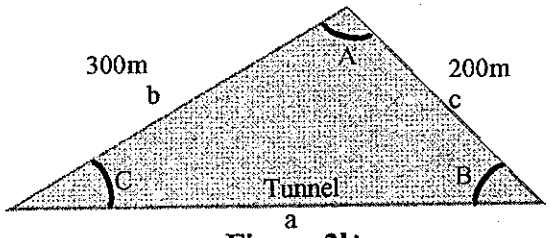

Figure 2b

(4 marks)

c) Given $= 1 - i$.

(i) Find the polar form of z. (3 marks)

(ii) Use De Moivre's Theorem to find z^4. Provide your answer in the form $a + bi$ where, a, b are real numbers. (3 marks)

Continued...

Question 3 (15 Marks)

a) Compute the following limit:

$$\lim_{n\to 1} g(x) \text{ where } g(x) = \begin{cases} x^2 + x - 3, & x \geq 1 \\ 2 - 3x, & x < 1 \end{cases}$$ (3 marks)

b) Suppose that $f(x) = \begin{cases} x + 3, & x \geq 2 \\ x^2 - 4x + m, & x < 2 \end{cases}$

If $f(x)$ is continuous at $x = 2$, find m using the conditions of continuity. (4 marks)

c) Given $y = \frac{9-2x}{x^2}$, find the derivative of y. Calculate the value of the derivative when $x = -1$. (3 marks)

d) Given the function, $f(x) = x^x$. Show that $f(x) = \exp(x \ln x)$, hence, find the derivative of $f(x)$. (5 marks)

Question 4 (10 Marks)

a) Use integration by parts to evaluate :

$$\int \frac{\ln x}{x^3} dx$$

(5 marks)

b) (i) Find the values of P and Q of the partial fraction decomposition of $f(x)$:

$$f(x) = \frac{7}{x^2 + x - 12} = \frac{P}{x + 4} + \frac{Q}{x - 3}$$

(ii) Hence, evaluate,

$$\int \frac{7}{x^2 + x - 12} dx$$

(5 marks)

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